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10/629,459	07/29/2003	Guogen Zhang	SVL920030024US1	7326

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EXAMINER
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ADAMS, CHARLES D

ART UNIT	PAPER NUMBER
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2164

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07/26/2007

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

## Office Action Summary

Application No.

10/629,459

Applicant(s)

ZHANG ET AL.

Examiner

Charles D. Adams

Art Unit

2164

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 08 May 2007.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-9 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-9 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)                     | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____                                      |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)          | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____  | 6) <input type="checkbox"/> Other: _____                          |

## DETAILED ACTION

### *Remarks*

1. In response to communications filed on 8 May 2007, claims 1, 4, and 7 are amended. Claims 1-9 are pending in the application.

### ***Claim Rejections - 35 USC § 103***

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 1-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Cochrane et al. (US Patent 5,963,936) in view of Galindo-Legaria et al. (US Patent 7,010,524).

As to claim 1, Cochrane et al. teaches a method of optimizing a query in a computer system, the query being performed by the computer system to retrieve data from a database stored on the computer system (see Abstract), the method comprising:

(a) during compilation of the query, maintaining a GROUP BY clause with one or more GROUPING SETS, ROLLUP or CUBE operations in its original form until after query rewrite (see column 7, lines 26-30, and column 7, lines 44-48. The "query parser lexes, parses, and semantically checks a query, producing an internal representation

that is rewritten". Therefore, the query is kept in its original form as an internal representation. Once it is rewritten, it is no longer in its original form); and

(b) at a later stage of query compilation, translating the GROUP BY clause with the GROUPING SETS, ROLLUP, or CUBE operations into a plurality of levels having one or more grouping sets (see 8:26-42, Figure 7. This step occurs after the step listed above) comprised of grouping columns (see 11:62-12:15. The GROUP BY sets are comprised of columns a, b, x, and y),

Cochrane et al. does not teach generating a query execution plan for the query with a super group block having an array of grouping sets, wherein each pointer points to a linked list representing grouping sets for a particular level.

Galindo-Legaria et al. teaches generating a query execution plan for the query with a super group block (see 5:25-34. The data structure storing the alternative plans) having an array of grouping sets (see 5:25-34), wherein each pointer points to a linked list representing grouping sets for a particular level (see 5:25-34, 5:56-63 and Figure 3. There are lists of 'groups' connected by links and pointers); and

Cochrane et al. as modified teaches:

(c) performing the query execution plan to retrieve data from a database stored on the computer system (see Cochrane et al. 7:41-43).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified Cochrane et al. by the teaching of Galindo-Legaria et al., since Galindo-Legaria et al. teaches that "there are situations where it is desirable to obtain information about execution plans in addition to the one

chosen by the optimizer for execution. In a product-development setting, for example, the ability to generate and test a large number of candidate plans for the same query is useful in designing, tuning, and checking the large number of components in a search engine, especially in its optimizer subsystem" (see 1:45-52).

As to claim 2, Cochrane et al. as modified teaches further comprising:

(1) at query execution time, dynamically determining a grouping sequence for the GROUP BY clause with the GROUPING SETS, ROLLUP or CUBE operations based on intermediate grouping sets, in order to optimize the grouping sets sequence (see Cochrane et al. 8:26-42, Figure 7).

As to claim 3, Cochrane et al. as modified teaches wherein the dynamically determining step further comprises (1) performing a GROUP BY for a base grouping set and then optimizing execution of the grouping sets sequence by selecting a grouping set having lowest cardinality from a previous one of the levels as an input to a grouping set on a next one of the levels (see 11:43-47. The GROUP BYs "are stacked from greatest to least cardinality". There is only one grouping set per level. It is inherent, then, that the chosen grouping set sequence from a previous one of the levels will be the smallest one on its level), and (2) performing a UNION ALL operation on the grouping sets (see 11:47-49 and Figure 7. "The base group by and all the GROUP BYs for ROLLUP1 are unioned together. If all of the GROUP BYs are unioned together, then it is functionally equivalent to a UNION ALL").

As to claim 4, Cochrane et al. teaches a computer-implemented apparatus for optimizing a query, the query being performed to retrieve data from a database, the apparatus comprising:

(a) a computer system;

(b) logic, performed by the computer system, for

(1) during compilation of the query, maintaining a GROUP BY clause with one or more GROUPING SETS, ROLLUP or CUBE operations in its original form until after query rewrite (see column 7, lines 26-30, and column 7, lines 44-48. The "query parser lexes, parses, and semantically checks a query, producing an internal representation that is rewritten". Therefore, the query is kept in its original form as an internal representation. Once it is rewritten, it is no longer in its original form); and

(2) at a later stage of query compilation, translating the GROUP BY clause with the GROUPING SETS, ROLLUP, or CUBE operations into a plurality of levels having one or more grouping sets (see 8:26-42, Figure 7. This step occurs after the step listed above) comprised of grouping columns (see 11:62-12:15. The GROUP BY sets are comprised of columns a, b, x, and y),

Cochrane et al. does not teach generating a query execution plan for the query with a super group block having an array of pointers, wherein each pointer points to a linked list representing grouping sets for a particular level.

Galindo-Legaria et al. teaches generating a query execution plan for the query with a super group block having an array of pointers (see 5:25-34. The data structure

storing the alternative plans), wherein each pointer points to a linked list representing grouping sets for a particular level (see 5:25-34, 5:56-63 and Figure 3. There are lists of 'groups' connected by links and pointers).

Cochrane et al. as modified teaches:

(3) performing the query execution plan to retrieve data from a database stored on the computer system (see Cochrane et al. 7:41-43).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified Cochrane et al. by the teaching of Galindo-Legaria et al., since Galindo-Legaria et al. teaches that "there are situations where it is desirable to obtain information about execution plans in addition to the one chosen by the optimizer for execution. In a product-development setting, for example, the ability to generate and test a large number of candidate plans for the same query is useful in designing, tuning, and checking the large number of components in a search engine, especially in its optimizer subsystem" (see 1:45-52).

As to claim 5, see the argument in regards to claim 2 above.

As to claim 6, see the argument in regards to claim 3 above.

As to claim 7, Cochrane et al. teaches an article of manufacture comprising a program storage device embodying instructions that, when read and executed by a computer system, cause the computer system to perform a method for optimizing a

query, the query being performed by the computer system to retrieve data from a database stored in a data storage device coupled to the computer system (see Abstract), the method comprising:

(a) during compilation of the query, maintaining a GROUP BY clause with one or more GROUPING SETS, ROLLUP or CUBE operations in its original form until after the query rewrite (see column 7, lines 26-30, and column 7, lines 44-48. The "query parser lexes, parses, and semantically checks a query, producing an internal representation that is rewritten". Therefore, the query is kept in its original form as an internal representation. Once it is rewritten, it is no longer in its original form); and

(b) at a later stage of query compilation, translating the GROUP BY clause with the GROUPING SETS, ROLLUP or CUBE operations into a plurality of levels having one or more grouping sets (see 8:26-42, Figure 7. This step occurs after the step listed above) comprised of grouping columns (see 11:62-12:15. The GROUP BY sets are comprised of columns a, b, x, and y)

Cochrane et al. does not teach generating a query execution plan for the query with a super group block having an array of pointers, wherein each pointer points to a linked list representing grouping sets for a particular level.

Galindo-Legaria et al. teaches generating a query execution plan for the query with a super group block having an array of pointers (see 5:25-34. The data structure storing the alternative plans), wherein each pointer points to a linked list representing grouping sets for a particular level (see 5:25-34, 5:56-63 and Figure 3. There are lists of 'groups' connected by links and pointers).



Cochrane et al. as modified teaches:

(c) performing the query execution plan to retrieve data from a database stored on the computer system (see Cochrane et al. 7:41-43).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified Cochrane et al. by the teaching of Galindo-Legaria et al., since Galindo-Legaria et al. teaches that "there are situations where it is desirable to obtain information about execution plans in addition to the one chosen by the optimizer for execution. In a product-development setting, for example, the ability to generate and test a large number of candidate plans for the same query is useful in designing, tuning, and checking the large number of components in a search engine, especially in its optimizer subsystem" (see 1:45-52).

As to claim 8, see the rejection in regards to claim 2 above.

As to claim 9, see the rejection in regards to claim 3 above.

### ***Response to Arguments***

4. Applicant's arguments filed 8 May 2007 have been fully considered but they are not persuasive.

Applicant argues that the combination of Cochrane et al. and Galindo-Legaria et al. does not maintain the GROUP BYs in their original form until after query rewrite.

Applicant argues that “instead, the optimization scheme of Cochrane et al. reduces the GROUP BYs during query rewrite, which necessarily comprises not maintaining the GROUP BY clause until after query rewrite”. It is noted that once the query is reduced, it is ‘rewritten’. As such, it was maintained in its original form until it was rewritten.

Applicant argues that replacing the groups of operators in Galindo-Legaria et al. with the grouping sets comprised of grouping columns in Cochrane et al. would render Galindo-Legaria et al. inoperative. However, Examiner notes that the GROUP BY command is an operator, and that Cochrane et al. teaches having a list of grouping sets in the form of GROUP BYs that are output to the query optimizer to develop a plan (see Figure 7 and 8:26-42).

Applicant also argues that the modification suggested by the Office Action is impermissible hindsight. In response to applicant's argument that the examiner's conclusion of obviousness is based upon improper hindsight reasoning, it must be recognized that any judgment on obviousness is in a sense necessarily a reconstruction based upon hindsight reasoning. But so long as it takes into account only knowledge which was within the level of ordinary skill at the time the claimed invention was made, and does not include knowledge gleaned only from the applicant's disclosure, such a reconstruction is proper. See *In re McLaughlin*, 443 F.2d 1392, 170 USPQ 209 (CCPA 1971). In this case, as Galindo-Legaria et al. teaches utilizing operators to generate a query execution plan, and that the GROUPING SETS and GROUP BYs of Cochrane et

al. are operators, in addition to the motivation provided in the rejection above, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified Cochrane et al. to include the teaching of Galindo-Legaria et al.

### ***Conclusion***

5. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Charles D. Adams whose telephone number is (571) 272-3938. The examiner can normally be reached on 8:30 AM - 5:00 PM, M - F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Charles Rones can be reached on (571) 272-4085. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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